REMARKS

Claims 1-31 and 97-98 are pending. Claims 1, 26-28 and 98 have been amended. A marked-up version of these claims, showing changes made, is attached hereto as Appendix A. Applicants respectfully request reconsideration in light of the amendments and following remarks.

Claim 1 has been amended to overcome the Examiner's objections and to even more clearly identify the claimed structure. Specifically, claim 1 recites "an annealed top conducting layer . . . comprising an oxygen permeable material " Support is found in Applicants' specification, page 10, lines 15-18. Similarly, claim 98 has been amended to positively recite a capacitor with "an annealed dielectric layer . . . and an annealed top conducting layer . . . comprising a metal oxide permeable to oxygen." Support is found in Applicants' specification, page 10, lines 15-16.

Claims 26-28 have also been amended to even more clearly define the structural elements. Claim 26 recites an "annealed top conducting layer [which] is a plasma enhanced annealed top conducting layer." Claim 27 recites an "annealed top conducting layer [which] is a remote plasma enhanced annealed top conducting layer." Claim 28 recites an "annealed top conducting layer [which] is an ultraviolet light enhanced annealed top conducting layer." Accordingly, withdrawal of the Examiner's objections to claims 1 and 26-28 is solicited.

Claims 1-31 and 98 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Agarwal. Reconsideration is respectfully requested.

The claimed invention relates to a capacitor structure with an <u>annealed</u> top conducting layer. The annealed top conducting layer yields a capacitor structure with reduced capacitor current leakage relative to conventional structures. In the prior art, prior to depositing the top conducting layer, only the dielectric layer was annealed to fill in oxygen vacancies (Applicants' specification, page 3, lines 17-18). However, with subsequent wafer fabrication processes, the annealed dielectric layer developed oxygen

vacancies which contributed to capacitor current leakage. The prior art did not teach or suggest annealing the top conductive layer. Applicants' claimed structure rectifies this problem associated with prior art structures. In fact, Applicants' capacitor structure yields a current leakage density reduced by a factor of at least 10 over the prior art structures (Applicants' specification, FIG. 2, page 12, lines 2-4, and FIG. 3, page 13, lines 1-5).

As such, independent claim 1 recites a "capacitor for a semiconductor device . . . comprising a bottom conducting layer, a dielectric layer . . . and an <u>annealed</u> top conducting layer . . . comprising an oxygen permeable material." (emphasis added). Similarly, claim 98 recites a "capacitor for a semiconductor device . . . comprising a bottom conducting layer, an <u>annealed</u> dielectric layer . . . and an <u>annealed</u> top conducting layer . . . comprising a metal oxide permeable to oxygen." (emphasis added).

The Office Action asserts that Agarwal teaches "an annealed oxygen permeable" top conducting layer (Office Action, page 4). In support, the Office Action cites Agarwal's Fig. 1 and Col. 5, lines 15-40. Applicants respectfully submit that Agarwal fails to teach an <u>annealed</u> top conducting layer. There is no support whatsoever in Agarwal, Col. 5, lines 15-40, for this assertion. In fact, there is <u>no</u> teaching <u>anywhere</u> in Agarwal for an annealed layer. Further, Agarwal does not teach that the top conducting layer comprises an "oxygen permeable material," as claim 1 recites.

Agarwal simply teaches that the upper electrode 70 "may be a single layer of suitable conductive material . . . or may have a multilayer structure identical to that of the lower electrode, with a platinum layer and a platinum-rhodium layer." (Col. 6, lines 49-54; Figure 2). Agarwal <u>does</u> <u>not</u> teach an annealed layer, much less one that is "an annealed top conducting layer . . . comprising an oxygen permeable material," as claim 1 recites.

Moreover, Agarwal does not teach an "annealed dielectric layer . . . and an annealed top conducting layer . . . comprising a metal oxide permeable to oxygen," as claim 98 recites. This is an additional reason for the allowance of claim 98.

Accordingly, for at least these reasons, withdrawal of the rejection for claims 1 and 98 is solicited. In addition, dependent claims 2-31 which depend from and incorporate all of the limitations of independent claim 1, are similarly allowable for at least the reasons provided above regarding claim 1.

Claim 97 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Agarwal in view of Li. Reconsideration is respectfully requested.

Li is not properly combinable with Agarwal because the cited references are directed to solving completely different problems. Agarwal provides an improved lower electrode consisting of "at least two layers." (Col. 5, lines 17-20) (emphasis added). Specifically, Agarwal's "lower electrode comprises at least two layers –a platinum layer 74 and a platinum-rhodium layer 76 –formed on the protective layer 64." (Col. 5, lines 28-30). Li is directed to providing a two-step formation process that yields conformal coverage of tungsten nitride at both the bottom surface and one or more side walls. (Col. 3, lines 12-15). Agarwal does not teach or suggest using a different material for the bottom electrode. In fact, Agarwal teaches that "[t]here is needed, therefore an improved lower electrode . . . having the advantages of a platinum electrode." (Col. 3, lines 16-20). There is no motivation to use a different material for Agarwal's bottom electrode. Further, Agarwal teaches that at least two different layers comprise the bottom electrode, not a single layer as Applicants' claim. Moreover, neither Agarwal nor Li teaches or suggests an annealed top conductive layer, much less, an annealed platinum layer as Applicants further claim.

Even assuming arguendo that the cited references might be combinable, which they are not, one still would not obtain Applicants' claimed invention. The cited references do not teach or suggest "a tungsten nitride bottom layer, a tantalum pentoxide layer formed over said tungsten nitride layer bottom layer, and an annealed platinum layer formed over said dielectric layer," as claim 97 recites (emphasis added).

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

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Respectfully submitted,

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APPENDIX A

1. (twice amended) A capacitor for a semiconductor device, said capacitor comprising:

a bottom conducting layer;

a dielectric layer formed over said bottom conducting layer; and

an annealed [oxygen permeable] top conducting layer formed over said dielectric layer, said top conducting layer comprising an oxygen permeable material.

26. (amended) The capacitor of claim 23, wherein [oxygen annealed layer] said annealed top conducting layer is a plasma enhanced annealed top conducting layer.

27. (amended) The capacitor of claim [26] 23, wherein said [oxygen containing anneal] annealed top conducting layer is a remote plasma enhanced [anneal] annealed top conducting layer.

28. (amended) The capacitor of claim 23, wherein said [oxygen containing anneal] annealed top conducting layer is an ultraviolet light enhanced [anneal] annealed top conducting layer.

98. (twice amended) A capacitor for a semiconductor device, said capacitor comprising:

a bottom conducting layer;

[a] an annealed dielectric layer formed over said bottom conducting layer; and

an annealed top conducting layer formed over said annealed dielectric layer, said top conducting layer comprising a metal oxide permeable to oxygen, wherein each of said bottom and annealed top conducting layers is formed of a material selected from the group consisting of platinum, platinum rhodium, platinum iridium, and tungsten nitride.